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**Amendments to the drawings**

Add the attached new sheet of drawings including FIG. 5.



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## Remarks

***General:***

Claims 25-33, 35-45, and 47-48 are pending in the application. Claims 25-33, 35-45, and 47-48 stand rejected and are now canceled. Claims 49-66 are new. Support for new claims 49-66 is found in the claims originally filed, as follows:

| New claim | Original claim(s) | | New claim | Original claim(s) |
|---|---|---|---|---|
| 49 | 1, 4, 7, 8 | | 58 | 15 |
| 50 | 2, 5 | | 59 | 16 |
| 51 | 3 | | 60 | 17 |
| 52 | 9 | | 61 | 18 |
| 53 | 10 | | 62 | 19 |
| 54 | 11 | | 63 | 20 |
| 55 | 12 | | 64 | 21 |
| 56 | 13 | | 65 | 23 |
| 57 | 14 | | 66 | 24 |

Support for the recitation of "high stress areas" in claim 49 is found in the specification at page 5, lines 8-22. Additional support for claim 57 is found in the specification at page 15, lines 7-8, page 12, lines 19-22, and page 12, line 26 to page 13, line 2.

No new matter has been added by this amendment.

***Drawings:***

The drawings were objected to as not showing every feature claimed in method claim 25. New drawing FIG. 5 corresponding to new claim 49 is filed herewith. No new matter is added by FIG. 5, because it is merely duplicative of claim 49.

FIG. 3 was objected to on the ground that the module labeled "Future System Requirements" is not discussed in the specification. The objection is traversed. There is no requirement that every feature shown in a drawing be discussed in the specification. The drawings constitute written description in their own right.



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FIG. 3 was objected to under 37 C.F.R. § 1.79. The objection is traversed. The Office has not shown, or even alleged, that FIG. 3 is unclaimed subject matter. The Office has not shown, or even alleged, that the box "Future System Requirements" in FIG. 3 constitutes a reservation for a future patent application. Absent those showings, 37 C.F.R. § 1.79 does not apply.

***Specification:***

The Office proposes changing the section heading "Detailed Description of the Drawings" to "Detailed Description of the Invention." The objection is traversed, because the proposed amendment would be factually incorrect. What is described on pages 13-28 with reference to the drawings is not "the Invention," it is only "a specific embodiment," 37 C.F.R. § 1.71(b). The Office cites to MPEP 608.01(g) but, as the Office is aware, the C.F.R. prevails over the MPEP.

***Claim objections:***

The Office's concern about the use of step numbers in dependent claims is understood, and step numbers are not used to identify steps in the dependent claims of the claims now presented.

***35 U.S.C. § 112 rejections:***

The rejections of certain claims previously presented are noted, and it is believed these grounds of rejection have been avoided in the claims now presented.

***35 U.S.C § 101:***

Previous claims 47 and 48 were rejected on the ground that the "product" of claim 47 could be interpreted as pure software, and the "carrier' of claim 48 could be interpreted as an ethereal medium.

FIG. 1 shows computer 14 as a conventional personal computer, with at least one disk drive. It is inherent in a conventional personal computer that programs are stored on disks or other tangible computer readable media when the computer is switched off, and are read into memory when the program is launched. FIG. 1 thus provides explicit support for new claim 66,



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reciting a computer, and at least inherent support for claim 63, reciting a computer readable medium.

*35 U.S.C § 103:*

Previous claims 25-33, 35, 37-40, and 42-45, and 47-48 were rejected as obvious over U.S. Patent No. 4,480,480 (Scott) in view of Carter et al., *Automated 3-D Crack Growth Simulation*, International Journal for Numerical Methods in Engineering, 47, 229-253 (2000) and further in view of EP 0 358 994 (Palusamy). Previous claim 36 was rejected as obvious over Scott, Carter, and Palusamy, and further in view of U.S. Patent No. 6,955,100 (Barich et al.) Previous claim 41 was rejected as obvious over Scott, Carter, and Palusamy, and further in view of U.S. Patent No. 5,867,977 (Zachary).

The rejections are traversed as to the claims now presented. First, as will be shown in more detail below with reference to new claims 49 and 57, Scott does not show all of the features for which the Office relies on it, and the other references do not remedy the defect. Second, Scott describes numerous embodiments related only by the type of sensor used. The Office cites to features of different embodiments indiscriminately, and the Office makes no showing that person of ordinary skill in the art would read those parts of those embodiments in combination as would be required to support the rejection. Third, the Office does not state a proper *prima facie* case for combining the different references. In each instance, the Office's purported justification for combining the references consists merely of a statement that the reference last added to the chain has certain features, without any indication of why it should have been obvious to combine those features with the combination previously presented. For all of these reasons, the present claims are believed not to be obvious over the cited references, and the rejection should be withdrawn as to the claims now presented.

Scott is directed to the use of a "structural moment detector" (SMD), which is a sensitive detector of bending, used primarily either to assess the stiffness of a member or the load on a member of known stiffness, or to detect vibration. Scott is directed almost entirely to live sensing. There is some comparison of measurements at different times, but the result generated appears consistently to be a direct comparison of present and past actual measurements. There is only one mention in Scott of computer simulation, col. 16, line 65, and that relates to "potential new designs," not to existing structures.



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Claims 49 and 57, in contrast, are directed to a method and system in which a computer model of a structure is created and updated in order to assess the integrity of the structure.

Claim 49, step ii), recites creating a computer model of the structure. The Office cites to three passages from Scott, but two of those passages do not mention computer models at all, and the third mentions only a computer models of "potential new designs."

Claim 49, step iii) recites collecting data relating to the estimated load on the structure. The Office cites to various passages from Scott, but none of those passages refers to collecting data relating to an estimated load. They all refer to comparing a measured actual load or actual strength (which is not estimated) with a design load (which is not collected).

Claim 49, step iv) recites analyzing the structure, using the computer model of the structure and the load data, in order to define high stress areas, in which areas of the structure future problems can be expected. None of the passages from Scott cited by the Office mentions analyzing the structure to identify areas in which future problems can be expected. Most of the cited passages relate to identifying actual problems after they arise, but some of them do not relate to monitoring structures at all. See col. 13, lines 25-27, which is directed to detecting a mechanical malfunction by the change in the vibrations of the mechanism.

Claim 49, steps v) and viii), recite installing, in the high stress areas, first and second sets of sensors for measuring the dimensions of the structure in said high stress areas. There is no disclosure or suggestion in Scott of first and second sets of sensors. In respect of previous claims 31 and 32 the Office cites to Scott, col. 16, line 21 (describing sensors "strategically located"), col. 17, lines 30-32 (sensors "at critical points"), col. 21, lines 50-52 (sensors at regular intervals along a pipe), Palusamy col. 2, lines 34-42 (monitoring "potential weak points") and col. 3, lines 12-29 (permanently mounted sensors at points that may erode very quickly) but none of those is quite on point. In particular, Palusamy's method is to monitor the entire pipework, in order to detect points that *later* become corroded or eroded, and may therefore *later* become high stress areas.

Claim 49, step vi) recites measuring, after a time interval, the dimensions of the structure in the high stress areas previously defined. Scott cannot do that because, as previously noted, he has not defined high stress areas.

Claim 49, steps vii) and ix)-x) recite updating the computer model of the structure, using the results of step vi) and updating the actual load data. Claim 49, step xi) recites re-analyzing



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the structure, using the updated computer model and the updated load data, in order to calculate a value for the integrity of the structure. There is no mention of a model in any of the passages from Scott cited by the Office.

Carter does not assist the Office. Carter describes a system for simulating the growth of a single large crack. The Office proposes to add Carter's crack-growth simulation to Scott, but there is nowhere in Scott that such a simulation would be useful, and there is no showing of how a crack-growth simulation could rationally be added to Scott's system which relies on actual measurement. Further, when Scott is detecting cracks, he is concerned, see col. 12, lines 8-35, with cracks that are not yet large enough for Carter's individual simulation to be applicable.

Palusamy, as discussed above, does not assist the Office. Palusamy, like Scott, is directed to actual measurement, and to detecting problem areas that arise after the monitoring starts, in contrast to the method of claim 49, which uses a computer simulation, and calculates high-stress areas representing a potential problem at the beginning of the monitoring.

Barish was cited only as showing ultrasonic testing, and Zachary was cited only as showing monitoring of temperature. Those references therefore do not remedy the deficiencies of Scott, Carter, and Palusamy.

Thus, the cited references, separately or in any combination, fail to teach or fairly suggest all the features of claim 49, and the rejection under 35 USC § 103 should be withdrawn as to claim 49.

Claim 57 is directed to apparatus to carry out the method of claim 49, and is believed to be allowable over the cited references for substantially the same reasons as claim 49. Claim 65 recites a computer program implementing all the features of claim 49, and is believed to be allowable over the cited references for substantially the same reasons as claim 49. Claims 50-56, 58-64, and 66 depend from claims 49, 57, and 65 and, without prejudice to their individual merits, those dependent claims are believed to be allowable over the prior art for at least the same reasons as their respective base claims.

***Conclusion:***

In view of the foregoing, all of claims 49-66 are believed to be allowable. Applicant respectfully requests reconsideration and withdrawal of the examiner's objections and rejections, and allowance of claims 49-66. An early notice of allowance is respectfully solicited. If the



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Examiner believes, however, that direct communication would advance prosecution, the Examiner is invited to telephone Henry Blanco White, telephone no. 215-988-3301.

Respectfully submitted,

Robert CAMPBELL

By: _____

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